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Abstract

SAFETY FEATURES OF THE DON REACTOR CONCEPT

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The DON is a heavy-water-moderated, organic-cooled, natural-uranium-fueled type of reactor. A 30 MWe version of this concept is presently being studied by the J.E.N. to serve as a prototype for large nuclear power plants.

Safety analyses of this prototype have been published containing theoretical and experimental work and this work is continuing. In these studies the safety aspects of the whole reactor concept are analyzed.

The reactor is a low pressure system due to the physical properties of the organic and the operating conditions of the moderator, this being one of the major advantages of this reactor concept.

Equations have been developed and programmed to describe the release of radioactive contaminants to the atmosphere from credible accidents. Different types of containment schemes are analyzed to prove that simple engineering features are enough to reduce the release below the permissible limits.

Mechanical and thermal barriers have to be located within coolant and moderator. The integrity of these barriers has to be maintained throughout the reactor life, thus posing a problem to be studied. A preliminary chemical compatibility study among the various components suggested for the DON prototype shows that no hazardous chemical reactions are likely to occur.

Reactor stability and its influence on nuclear accidents are discussed. The radiological consequences of reactor operation are analyzed to prove that reactors of this type can be built and operated in normal locations without undue risk to the health and safety of the public and without adding costly or novel engineering safety features.

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